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On-chip Arrayed Lidar with Extreme Skin-depth Waveguides

E-skid metamaterial waveguides enhance optical phased arrays to enable cost-effective, high-efficiency light-beam steering with a 180-degree field of view for applications like LiDAR and telecommunications.

Researchers from Purdue University have found a new way to enhance optical phased arrays (OPA), used in applications requiring light-beam steering with no moving parts. The researchers propose an approach using a very special design called e-skid metamaterial waveguides, which reduce interference, or crosstalk, between the closely spaced optical elements and minimize energy loss. The main benefit of reducing crosstalk is to increase the field of view (FoV) for LiDAR applications. Using this invention, it is possible to cover the entire 180-degree FoV without requiring a moving part. This not only simplifies the system but also helps reduce costs and volume while potentially increasing the range. This makes the technology ideal for applications such as LiDAR that require very precise and efficient light steering. Unlike traditional methods, this approach ensures consistent performance and is less vulnerable to manufacturing flaws.

Technology Validation:

Researchers provided a comparison of the e-skid waveguides' performance with other approaches, highlighting their lower crosstalk and propagation loss. These results are supported by theoretical modeling and prior work by the inventors, which included detailed analysis of the waveguide design and its behavior under various conditions.

Advantages:

-Compatible with a variety of materials

-Less sensitive to manufacturing imperfections

-Compact design

Applications:

Technology ID
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Category
Computing/Photonic & Optical Computing Technologies

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-LiDAR Systems

-Telecommunications

-Optical Communications

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